

REMARKS

In the Office Action, claims 1-3, 7-8, 10-12, 14-18, 20-22, 24, 26-29 and 32-39 were rejected, and claims 4, 5, 9, 13, 19, 23, 25, 30 and 31 were objected to by the Examiner.

Applicants thank the Examiner for indicating the allowability of claims 4, 5, 9, 13, 19, 23, 25, 30 and 31. By this Reply and Amendment, claims 1, 3, 4, 11, 18, 21, 26, 32 and 37 have been amended, claim 2 has been canceled without prejudice, and claims 1 and 3-39 remain pending in the present application. All claim amendments are fully supported throughout the written description and figures of the specification.

Claims 1, 3, 7, 8, 10, 18, 32-34 and 36-39 were rejected under 35 USC 102(b) as anticipated by the Deters reference, US Patent No.: 3,265,001. This rejection is respectfully traversed, however independent claims 1, 18, 32 and 37 have been amended to clarify aspects of the claim language. Those independent claims, along with their dependent claims, are believed patentably distinct over the cited reference.

The Deters reference discloses a centrifugal pump having multiple stages, each stage having an impeller 28 mounted on a drive shaft 22. (See column 2, lines 46-49). Additionally, each stage comprises a diffuser sleeve 60 having an upper portion 60". A sleeve insert 122 is affixed to the upper sleeve portion 60" and includes an axial portion spaced from shaft 22 and a radial portion 122' that forms a bearing face for engagement with a hub thrust bearing 120. (See column 4, line 73, through column 5, line 10). Accordingly, element 122 does not form part of impeller 28. This is contrary to the characterization of the Deters reference found in the Office Action where each impeller 28 is alleged to have "a short hub 38 formed of a moldable plastic and a sleeve 122 axially adjacent the short hub 38." Accordingly, the Deters reference does not disclose every element of the subject claims and therefore fails to support the rejection under 35 USC 102(b).

With respect to the specific claims rejected, the reference does not disclose or suggest numerous claim elements. For example, the reference fails to disclose or suggest each impeller having a short hub formed of a moldable plastic and a sleeve axially adjacent the short hub,

wherein the sleeve is positioned on the shaft "for rotation within the next adjacent diffuser, the sleeve being formed of a non-plastic material to better withstand abrasive wear relative to the moldable plastic" as recited in amended, independent claim 1. The reference also fails to disclose or suggest forming a diffuser of a moldable material combined with a reinforcement member "molded into the moldable material, the reinforcement member being disposed generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 18. Similarly, the reference fails to disclose or suggest a diffuser formed of a moldable material combined with a reinforcement member "molded into the moldable material, the reinforcement member being disposed generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 32. The reference also fails to disclose or suggest an impeller having a plurality of vanes formed from a moldable material and a sleeve formed from a material "comprising nickel-resist to provide greater wear resistance than the moldable material" as recited in amended, independent claim 37. It should be noted that the language added to claim 37 is comparable to the language found in dependent claim 25 which is indicated as allowable. Accordingly, independent claims 1, 18, 32 and 37 are patentably distinguishable over the Deters reference.

Claims 3, 7, 8, 10, 33, 34, 36, 38 and 39 ultimately depend from one of the independent claims discussed above. Accordingly, the subject dependent claims are patentable over the cited reference for the reasons provided above with respect to their corresponding independent claims, as well as for the unique subject matter found in those dependent claims.

Claims 18, 20 and 32-35 were rejected under 35 USC 102(b) as anticipated by the Ekey reference, US Patent No.: 3,779,668. This rejection is respectfully traversed, however independent claims 18 and 32 have been amended to clarify aspects of the claim language.

The Ekey reference discloses a centrifugal pump having stages 12 that each include a diffuser 14 and an impeller 15. (See column 2, lines 57-60). The diffuser 14 is mounted within a housing 13 and has a front plate 30 with a central hub 34. The central hub 34 is provided with an annular metallic insert 35 that forms an interior bearing surface for an impeller hub 16. (See

column 3, lines 32-38). However, the Ekey reference fails to disclose numerous elements of the subject claims.

For example, the reference fails to disclose or suggest forming a diffuser of a moldable material combined with a reinforcement member molded into the moldable material, the reinforcement member being disposed "generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 18. Similarly, the reference fails to disclose or suggest a diffuser formed of a moldable material combined with a reinforcement member molded into the moldable material, the reinforcement member being disposed "generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 32. Accordingly, independent claims 18 and 32 are patentably distinguishable over the cited reference.

Claims 20 and 33-35 ultimately depend from one of the independent claims discussed in the preceding paragraph. Accordingly, the subject dependent claims are patentable over the cited reference for the reasons provided above with respect to their corresponding independent claims, as well as for the unique subject matter found in those dependent claims.

Claims 1, 2, 7, 8, 18, 21, 22, 24, 26-29 and 32-34 were rejected under 35 USC 102(b) as anticipated by the Chien et al. reference, US Patent No.: 6,439,835. This rejection is respectfully traversed, however independent claims 1, 18, 21, 26 and 32 have been amended to clarify aspects of the claim language.

The Chien et al. reference discloses a pump shell for a multistage pump. The pump is formed by assembling pump shell units 6, and each pump shell unit has an impeller 7, driven by a shaft 5, and a diffuser 8. (See column 3, lines 62-67). Each impeller has a hub 72 with a plastic member 722 through which a hole extends for engaging shaft 5. Additionally, each pump shell unit 6 has a plastic sleeve 74 which rotates with the shaft. (See column 4, lines 27-46). The reference provides no indication that the separate plastic sleeve 74 provides any different resistance to wear than plastic member 722 of hub 72.

Accordingly, the reference fails to disclose or suggest numerous elements of the subject claims. For example, the reference fails to disclose or suggest each impeller having a short hub formed of a moldable plastic and a sleeve axially adjacent the short hub, wherein the sleeve is "formed of a non-plastic material to better withstand abrasive wear relative to the moldable plastic" as recited in amended, independent claim 1. The reference also fails to disclose or suggest a centrifugal pump with a diffuser of a moldable material combined with a reinforcement member "molded into the moldable material, the reinforcement member being disposed generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 18. Similarly, the reference fails to disclose or suggest a composite diffuser formed of a moldable material combined with a reinforcement member "molded into the moldable material, the reinforcement member being disposed generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 32. The reference also fails to disclose or suggest positioning a wear resistant sleeve axially adjacent a short hub of moldable material to create a longer hub with the wear resistant sleeve "being formed of a material having greater wear resistance than the moldable material" as recited in amended, independent claim 21. The reference further fails to disclose or suggest the method of forming a composite diffuser with "a stiffening member integrally molded into a moldable plastic material such that the stiffening member is at least partially disposed at a radially outlying region of the composite diffuser" as recited in amended, independent claim 26. Accordingly, independent claims 1, 18, 21, 26 and 32 are patentably distinguishable over the Chien et al. reference.

Claims 7, 8, 22, 24, 27-29, 33 and 34 ultimately depend from one of the independent claims discussed in the preceding paragraph. Accordingly, the subject dependent claims are patentable over the cited reference for the reasons provided above with respect to their corresponding independent claims, as well as for the unique subject matter found in those dependent claims.

Claims 11, 12, 14 and 15 were rejected under 35 USC 103(a) as unpatentable over the Deters reference in view of the Du et al. reference, US Patent No.: 6,688,860. This rejection is

respectfully traversed, however independent claim 11 has been amended to clarify aspects of the claim language and is believed patentable over the cited references.

The Du et al. reference is relied on as disclosing a submersible pump having a motor 14 and a motor protector 16, however this disclosure in combination with the Deters disclosure is not sufficient to support the rejection. For example, the references, taken alone or in combination, do not disclose or suggest pump stages with each stage comprising an impeller having a plurality of vanes and a sleeve that "rotates with the plurality of vanes," the "plurality of vanes being formed of a moldable plastic and the sleeve being formed of a material having greater wear resistance than the moldable plastic" as recited in amended, independent claim 11. Claims 12, 14 and 15 directly depend from independent claim 11 and are patentable for the reasons provided above with respect to claim 11 as well as for the unique subject matter recited in those dependent claims.

Claim 18 was rejected under 35 USC 103(a) as unpatentable over the Deters reference in view of the Zelder reference, US Patent No.: 5,692,880. This rejection is respectfully traversed, however independent claim 18 has been amended to clarify aspects of the claim language and is believed patentable over the cited references.

The Zelder reference is relied on for disclosing an internal hub bushing 4, however this disclosure in combination with the Deters disclosure is not sufficient to support the rejection. Hub bushing 4 is an internal bushing designed for mounting the impeller on the shaft of an electric motor. (See column 2, lines 26-31). Accordingly, the references, taken alone or in combination, do not disclose or suggest a pump diffuser formed of moldable material and a reinforcement member molded into the moldable material, the "reinforcement member being disposed generally circumferentially along a radially outlying region of the diffuser" as recited in amended, independent claim 18. Accordingly, claim 18 is patentably distinguishable over the cited references.

Claims 11, 12, 15, 16 and 17 were rejected under 35 USC 103(a) as unpatentable over the Ekey reference in view of the Du et al. reference. This rejection is respectfully traversed,

however independent claim 11 has been amended to clarify aspects of the claim language and is believed patentable over the cited references.

The Du et al. reference is again relied on as disclosing a submersible pump having a motor 14 and a motor protector 16. However, this disclosure in combination with the Ekey disclosure is not sufficient to support the rejection. For example, the references, taken alone or in combination, do not disclose or suggest pump stages with each stage comprising an impeller having a plurality of vanes and a sleeve that "rotates with the plurality of vanes," the "plurality of vanes being formed of a moldable plastic and the sleeve being formed of a material having greater wear resistance than the moldable plastic" as recited in amended, independent claim 11. Claims 12, 15, 16 and 17 ultimately depend from independent claim 11 and are patentable for the reasons provided above with respect to claim 11 as well as for the unique subject matter recited in those dependent claims.

In view of the foregoing remarks, the pending claims are believed patentable over the cited references. However, if the Examiner believes certain amendments are necessary to clarify the present claims or if the Examiner wishes to resolve other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,



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